

## Processing Seismic Data

### Abstract

The invention relates to processing seismic data that contains both a desired signal and swell noise. The method is applicable to seismic data in the frequency-space domain method and comprises determining a signal-only prediction filter from the seismic data at a first frequency at which swell noise is not present, and applying the prediction filter to seismic data at a second frequency at which swell noise is present. This attenuates swell noise in the seismic data at the second frequency.

In one embodiment, the prediction filter for a frequency  $f_L$ , the lowest frequency at which swell noise is present, is determined from seismic data at frequency  $f_{H+1}$ , where  $f_H$  is the highest frequency at which swell noise is present. The prediction filter for a frequency  $f_{L+1}$  is determined from seismic data at frequency  $f_{H+2}$ , and so on, so that the prediction filter for frequency  $f_{H+1}$  is determined from seismic data at frequency  $f_{2H-L+1}$ . In this way, the prediction filter for each frequency in the swell noise range is determined from seismic data outside the swell noise range, but at a frequency close to the swell noise range, and this provides effective extraction of the signal and attenuation of the swell noise. Furthermore, no prediction filters are applied to data of more than one frequency, so that an error in the determination of a particular prediction filter will have only limited effect on the processed data.

[Figure 3]